

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference 02P00480PC	FOR FURTHER ACTION	See item 4 below
International application No. PCT/JP2004/002534	International filing date (<i>day/month/year</i>) 02 March 2004 (02.03.2004)	Priority date (<i>day/month/year</i>)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant FUJI ELECTRIC HOLDINGS CO., LTD.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).
2. This REPORT consists of a total of 6 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.
3. This report contains indications relating to the following items:

<input checked="" type="checkbox"/> Box No. I	Basis of the report
<input type="checkbox"/> Box No. II	Priority
<input type="checkbox"/> Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/> Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/> Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input checked="" type="checkbox"/> Box No. VI	Certain documents cited
<input type="checkbox"/> Box No. VII	Certain defects in the international application
<input type="checkbox"/> Box No. VIII	Certain observations on the international application
4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Date of issuance of this report 29 November 2006 (29.11.2006)
Facsimile No. +41 22 338 82 70	Authorized officer <div style="text-align: center; font-weight: bold;">Yoshiko Kuwahara</div> e-mail: pt07@wipo.int

PATENT COOPERATION TREATY

TRANSLATION

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

Date of mailing
(day/month/year)

Applicant's or agent's file reference

02P00480PC

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/JP2004/002534

International filing date (day/month/year)

02.03.2004

Priority date (day/month/year)

International Patent Classification (IPC) or both national classification and IPC

Applicant

FUJI ELECTRIC HOLDINGS CO., LTD.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☒ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/JP

Authorized officer

Facsimile No.

Telephone No.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2004/002534

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐

This opinion has been established on the basis of a translation from the original language into the following language

_____, which is the language of a translation furnished for the purposes of international search (under Rule 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

☐

a sequence listing

☐

table(s) related to the sequence listing

b. format of material

☐

in written format

☐

in computer readable form

c. time of filing/furnishing

☐

contained in the international application as filed.

☐

filed together with the international application in computer readable form.

☐

furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/JP2004/002534

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims <u>1-11</u>	YES
	Claims _____	NO
Inventive step (IS)	Claims _____	YES
	Claims <u>1-11</u>	NO
Industrial applicability (IA)	Claims <u>1-11</u>	YES
	Claims _____	NO

2. Citations and explanations:

Document 1: JP, 2002-289768, A (Rohm Co., Ltd.), 4 October, 2002 (04.10.02), Full text; all drawings
 Document 2: JP, 2001-274201, A (Toshiba Corp.), 5 October, 2001 (05.10.01), Full text; all drawings
 Document 3: JP, 8-003732, A (Seiko Instruments Inc.), 9 January, 1996 (09.01.96), Full text; all drawings

The subject matter of claim 1 does not appear to involve an inventive step in view of documents 1 and 2 cited in the ISR. Document 1 effectively suggests bonding between the electrodes on a semiconductor chip through solid-liquid diffusion of a low-melting-point metal layer. So, it is easy for a person skilled in the art to apply such a bonding method to the packaging of an electronic component on a circuit board as described in document 2.

The subject matter of claim 2 does not appear to involve an inventive step in view of documents 1 and 2. It is easy for a person skilled in the art to employ the material used for the first and/or the second bonding metal layers described in [0015] and [0016] of document 2 as a substitute for the second metal described in document 1.

The subject matter of claim 3 does not appear to involve an inventive step in view of documents 1 and 2. Either of the subject matters described in documents 1 and 2 envisages bonding at lower temperatures, so it is easy for a person skilled in the art to conduct bonding at a heating temperature within the range described in claim 3.

The subject matter of claim 4 does not appear to involve an inventive step in view of documents 1 and 2. The upper and lower limits of the total thickness of the lowmeltingpoint metal layer as defined in claim 4 are not considered to carry any critical significance, and such a thickness is a parameter that can be set, as required, according to the bonding conditions. So, it is easy for a person skilled in the art to arrive at a thickness within the range specified in claim 4.

The subject matter of claim 5 does not appear to involve an inventive step in view of documents 1 and 2. Reference to the material described in claim 5 is found in [0014] of document 2.

The subject matter of claim 6 does not appear to involve an inventive step in view of documents 1 and 2. The specification on roughness of the electrode surface set forth in claim 6 does not exhibit a particularly special effect and therefore, is considered to be a mere matter of design variation that a person skilled in the art could have easily arrived at as required. During the process of bonding the electrodes, while pressing them against each other for better contact is a natural step to be taken into

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Box No. V

Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement

account, plastic deformation of the electrodes is also a phenomenon that can be frequently induced by such pressure application.

The subject matters of claims 7 and 8 do not appear to involve an inventive step in view of documents 1 and 2. There seems to be no special difference in effect whether heating and pressure application are continued until the completion of solid-liquid diffusion or until an intermediary alloy layer is formed; therefore, employing either of these approaches is a mere matter of design variation that can be arrived at by a person skilled in the art.

The subject matter of claim 9 does not appear to involve an inventive step in view of documents 1 and 2. For the process of laminating lowmeltingpoint metal layers, which are then formed into an alloy layer, see Fig. 3 (B) of document 2. Furthermore, although claim 9 specifies a requirement of taking the trouble to "preheat", this extra step does not appear to bring about any new special technical effect.

The subject matters of claims 10 and 11 do not appear to involve an inventive step in view of document 3 cited in the ISR, and documents 1 and 2. In an alloy vapor deposition process, vapor pressure and activity coefficients are non-negligible parameters, as suggested by formula (3) of document 3. Therefore, by controlling these parameter values, a person skilled in the art can easily form the second metal described in document 1.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2004/002534

Box No. VI Certain documents cited

1. Certain published documents (Rule 43bis.1 and 70.10)

Application No. Patent No.	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (valid claim) (day/month/year)
JP 2004-111935 A	08.04.2004	22.08.2003	30.08.2002
JP 2004-111936 A	08.04.2004	22.08.2003	30.08.2002

2. Non-written disclosures (Rule 43bis.1 and 70.9)

Kind of non-written disclosure	Date of non-written disclosure (day/month/year)	Date of written disclosure referring to non-written disclosure (day/month/year)
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